Sept. 9, 1958 A. L. WILLIAMS 2,850,998

APPARATUS FOR GUIDING AND SIZING MATERIAL

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Fig. 1

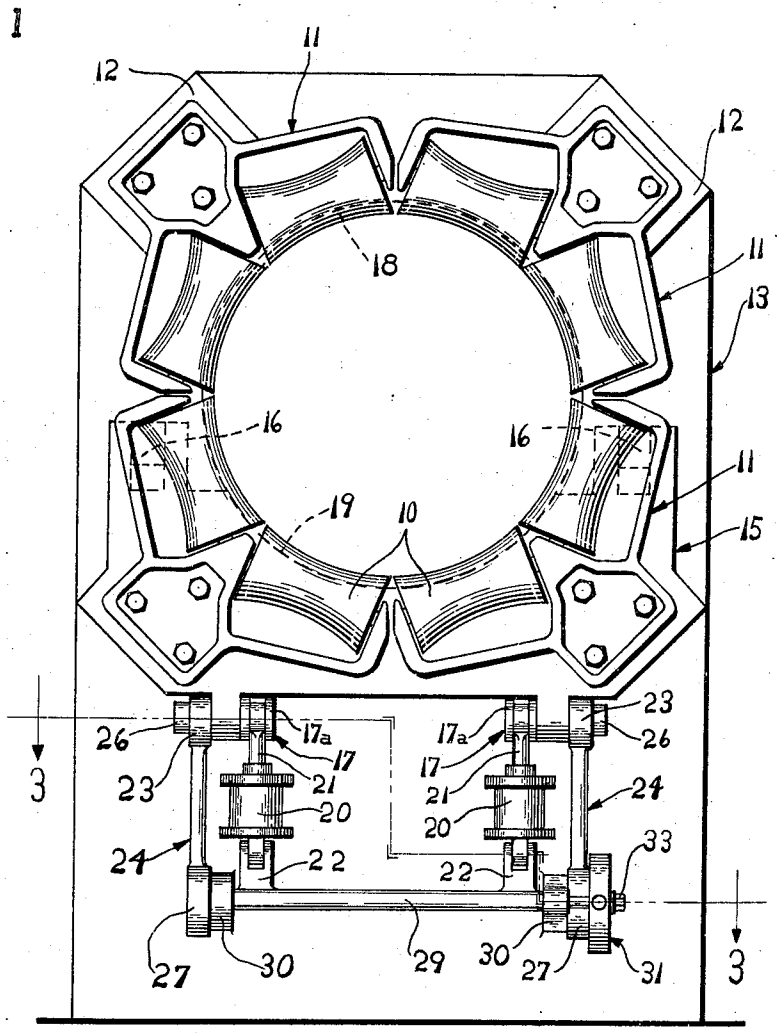

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Fig. 3

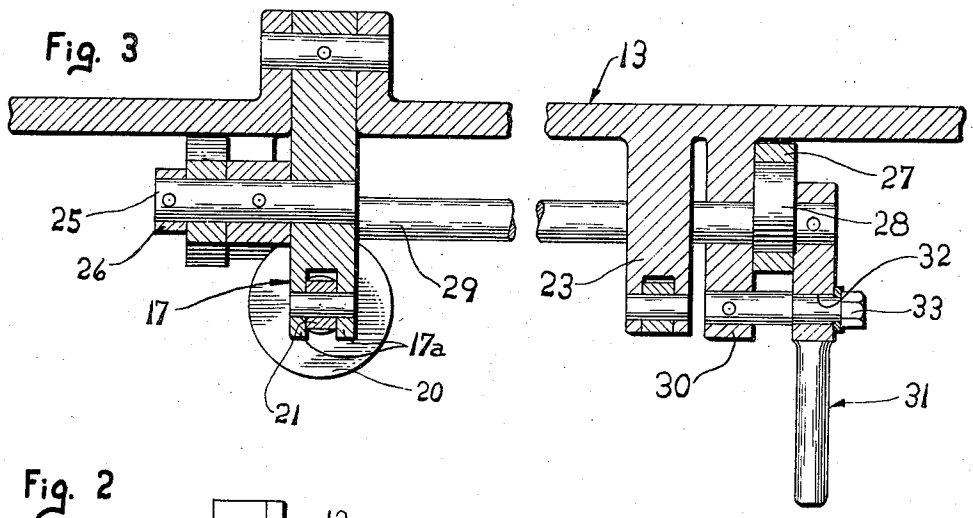

Fig. 2

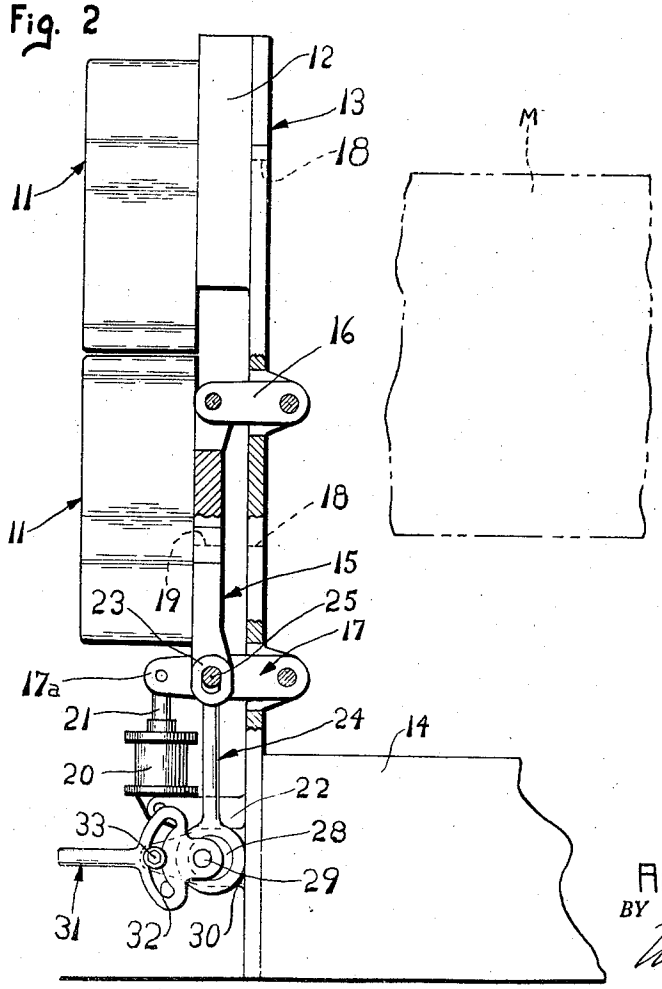

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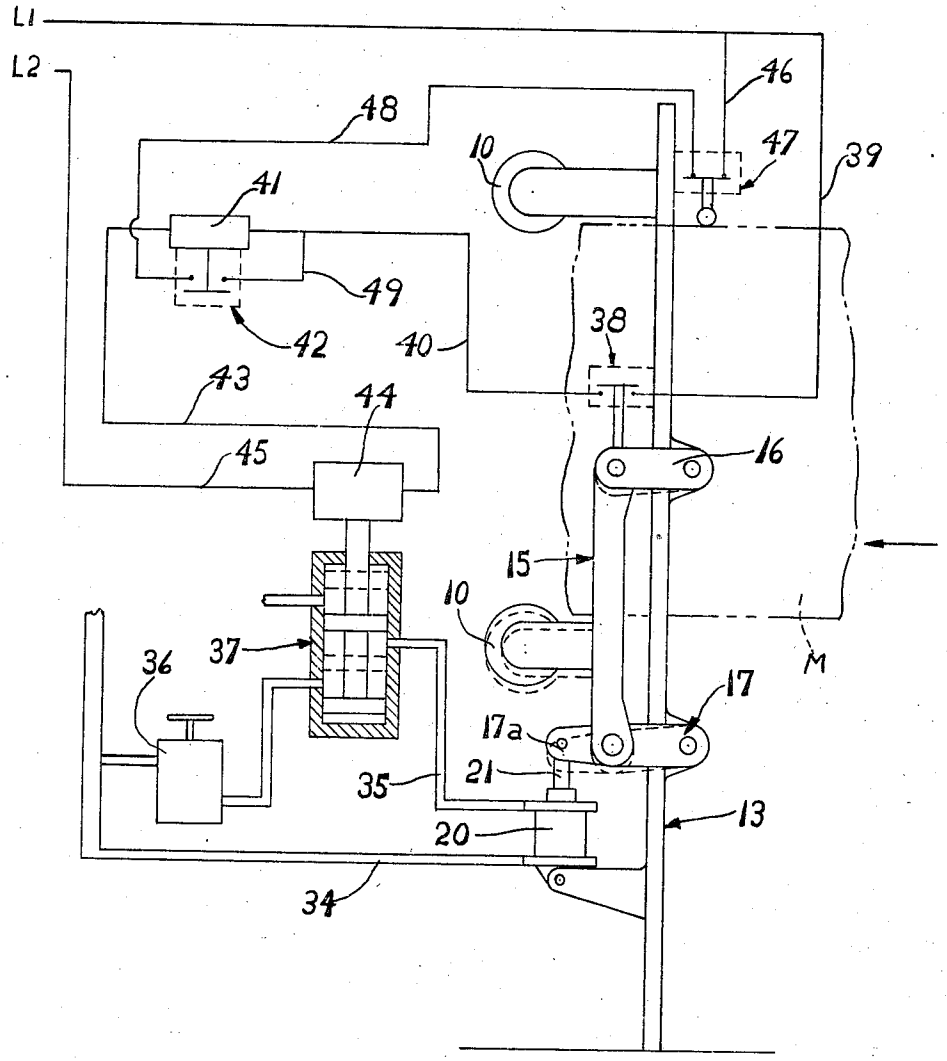
Fig. 4



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2,850,998

APPARATUS FOR GUIDING AND SIZING MATERIAL

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Application June 25, 1953, Serial No. 364,135

4 Claims. (Cl. 113—33)

My invention relates to apparatus for guiding and sizing material, more particularly to apparatus adapted for use with material working mechanism such as welders and the like, and the principal object of my invention is to provide new and improved apparatus of the character described.

The about to be described invention is particularly well adapted for use with seam welder apparatus similar to that disclosed in application for Letters Patent, Serial Number 234,238, filed June 29, 1951, now Patent No. 2,771,046 and entitled Apparatus For Producing Tubular Members. However, it will be apparent that my invention may easily be adapted for use wherever it is advantageous to guide and size material.

During the use of apparatus similar to that disclosed in the above mentioned application, difficulties have arisen in guiding and sizing the material being worked because the material frequently failed to properly enter the pass formed by the guiding and sizing rolls. This sometimes caused the apparatus to jam; at best, it resulted in distorted and mis-shapen work. However, the use of my invention has completely eliminated the difficulties experienced heretofore and has resulted in higher production with fewer work stoppages and a considerable reduction in rejects. These and other advantages will become apparent from a study of the following description and from the drawings appended hereto.

In the drawings accompanying this specification and forming a part of this application, there is shown, for purpose of illustration, an embodiment which my invention may assume, and in these drawings:

Figure 1 is a front elevational view of apparatus embodying my invention,

Figure 2 is a side elevational view of the embodiment shown in Figure 1, certain parts being broken away to show the internal construction,

Figure 3 is an enlarged, broken, fragmentary sectional view generally corresponding to the line 3—3 of Figure 1, and

Figure 4 is a generally diagrammatic view showing the means employed in the present embodiment to effect operation of my invention.

The presently disclosed embodiment of my invention is particularly adapted to guide and size sheet material that is formed into a tubular member having juxtaposed edges that are adapted to be welded together. Accordingly, the present embodiment of my invention provides a circular pass through which the formed material M that is to be sized is moved in an axial direction to the welding electrodes where the juxtaposed edges will be joined together.

As herein disclosed, a plurality of rolls **10** having concave peripheries are arranged as shown to form the aforementioned circular pass. In the present embodiment, the rolls **10**, known as hour-glass rolls for an obvious reason, are arranged in pairs, the respective rolls of each pair of rolls being rotatably secured to a respective bracket **11**. The upper brackets **11** (in the position of parts shown in Figures 1 and 2) are secured to respective bosses

12 that are welded or otherwise secured to a substantially vertically disposed plate **13**. The plate **13** is supported in position adjacent the welding apparatus (not shown) by any suitable means; for example, it may be secured to a foot-like projection **14** that extends from the welding apparatus.

The lower brackets **11** together with the hour-glass rolls **10** carried thereby are secured to a plate **15** that is pivotally secured to the plate **13** by means of spaced-apart upper links **16** and spaced-apart lower links **17**. Each link **17** has a bifurcated portion **17***a* that extends beyond the plate **15** for a purpose to be shown. As shown in Figures 1 and 2, the plate **13** is apertured at **18** and the plate **15** has its upper edge cut away at **19** to provide for passage of the material M.

The means provided in the presently disclosed embodiment for holding the plate **15** (and the rolls **10** carried by the lower brackets **11**) adjacent the rolls **10** carried by the upper brackets **11** comprises a pair of spaced-apart air cylinders **20** each having a piston rod **21** extending therefrom. The blank end of each cylinder **20** is pivotally secured to a respective lug **22** that extends laterally of the plate **13** and the piston rod **21** of each cylinder is pivotally secured between the legs of the bifurcated portion **17***a* of a respective link **17**. It will now be apparent that the plate **15** and the rolls **10** carried thereby will be urged upwardly toward the rolls **10** carried by the plate **13** when the blank ends of the cylinders **20** are pressurized.

Means are provided to limit the upward movement of the plate **15** so that the lower rolls may be properly spaced from the upper rolls. Furthermore, such means provides for adjustment so that the spacing between the rolls may be varied in accordance with requirements.

Accordingly, a slotted-end portion **23** of a link **24** is positioned about an extending portion of a pivot pin **25** that secures the plate **15** and the link **17** together. As clearly shown in Figure 1, two similar links **24** are provided and each is held against accidental disassembly upon its respective pin **25** by means of an enlarged collar **26** formed integrally with, or secured by any suitable means, to a respective pin **25**.

The lower-end **27** of each link **24** is enlarged, as shown, and each is apertured to provide a journal for an eccentric **28**. Each eccentric is secured to a shaft **29** that is rotatably supported by spaced-apart lugs **30** that extend laterally from the plate **13**. The means presently employed to rotate the shaft **29** and the eccentrics **28** secured thereto comprises a lever **31** secured to one end of the shaft **29** and formed with a slot **32** through which projects a pin that is anchored in the adjacent lug **30**. A nut **33** is threaded upon the aforementioned pin to lock the lever **31** in its adjusted position.

It will be clear that the minimum spacing between the upper and lower rolls **10** may be adjusted by moving the links **24** through movement of the lever **31**, shaft **29**, and eccentrics **28**. However, it will be clear that the slots in the end portions **23** of the links **24** will permit the plate **15**, together with the rolls **10** carried thereby, to be shifted downwardly a limited amount against the urging of the cylinders **20** without affecting the previously mentioned, minimum spacing adjustment of the respective rolls.

As shown diagrammatically in Figure 4, the means for effecting operation of the apparatus thus far described comprises a conduit **34** connecting the blank ends of the cylinders **20** to a source of air pressure. A conduit **35** connects the rod ends of the cylinders **20** to the source of air pressure; however, a conventional pressure regulating valve **36** and a suitable, commercially available solenoid operated valve **37** are interposed in the line **35** for a purpose to be shown.

The electrical control circuit for the solenoid valve **37**

comprises a normally closed switch 38 responsive to movement of the plate 15. The switch 38 has one of its contacts connected to L–1 through a conductor 39; the other contact being connected to L–2 through a conductor 40, the solenoid coil 41 of a contactor 42, a conductor 43, the solenoid coil 44 of the valve 37, and thence to L–2 through a conductor 45.

A holding circuit is provided for the solenoids 41, 44 and includes a conductor 46, a normally open switch 47 interposed in the path of the material M, a conductor 48, the normally open contacts of the contactor 42, and a conductor 49 connected to conductor 40.

Operation of my invention is as follows: With the cylinders 20 connected to a source of air pressure and the valve 37 in the full-line position shown, the regulating valve 36 will first be adjusted to lower the pressure at the rod ends of the cylinders. With full line pressure at the blank ends of the cylinders 20 and with reduced pressure at the rod ends thereof, a resultant force will be provided that will urge the piston rods 21 outwardly of the cylinders to thus urge the lower rolls 10 toward the upper rolls 10. It is to be understood, however, that the valve 36 will be so adjusted that the force holding the rolls 10 together will be relatively small for a purpose to be shown.

As illustrated in Figure 4, material M is shown immediately prior to the time it is urged into the pass provided by the rolls 10 by the welding apparatus or the like (not shown) with which the presently disclosed embodiment of the invention is associated. As illustrated, neither of the solenoids 41, 44 are energized since the switch 38 is held open by the plate 15 that is being held in its uppermost position by the cylinders 20. At this time, engagement of the material M with the switch 47 holds this switch closed; however, the holding circuit in which switch 47 is interposed is not energized since the contacts of contactor 42 are still in their normally open position.

As the material M moves in the direction of the arrow between the rolls 10, the lowermost rolls 10 will be forced downwardly (as shown by the dot-dash lines in Figure 4) against the relatively small resultant force that holds these rolls in their uppermost position. Movement of the rolls downwardly will close switch 38 and this will energize solenoids 41, 44 by completing an electrical circuit from L–1 to L–2 through conductor 39, switch 38, conductor 40, solenoid 41, conductor 43, solenoid 44 and conductor 45.

Energization of solenoid 44 will shift valve 37 from the full-line position shown to the dotted-line position and thus interrupt communication between the rod ends of the cylinders 20 and the source of pressure and exhaust the rod ends of the fluid cylinders to the atmosphere. This will cause the lowermost rolls to be returned to their full-line position under the full force of the line pressure exerted against the blank ends of the cylinders 20 and thus provide a relatively fixed, accurately sized pass for guiding and sizing the material.

The rolls 10 will continue to be held together under the full force of the line pressure even though the switch 38 has been opened because energization of the solenoid 41 will close the points in the contactor 42 and thus energize the holding circuit to maintain the valve 37 in its dotted-line position.

When the material M has been moved through the pass provided by the rolls 10 an amount sufficiently so that its trailing edge disengages from the switch 47, this switch will return to its normally open position and thus de-energize the holding circuit and the solenoids 41, 44. De-energization of the solenoid 44 will cause the valve 37 to return to its full-line position and the valve will therefore once again reduce the effective force exerted by the cylinders 20.

Even though the trailing end of the material still has not passed between the rolls 10, it is to be understood

that the reduction in force holding the rolls together will not permit the trailing edge of the material to spring the rolls apart once again since, in the present embodiment, the material that has already moved through the pass has been welded together and this will prevent the relatively short length remaining from springing out of shape.

It will be obvious that subsequent pieces of material may be fed through the pass formed by my invention in rapid succession, the aforementioned operating cycle taking place as the leading edge of each piece of material enters the pass.

In view of the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described, hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. Apparatus for guiding and sizing material, comprising guiding and sizing means mounted for movement in a direction toward and away from each other, said guiding and sizing means being engageable with said material and providing a pass through which said material is movable, fluid cylinder means for urging said guiding and sizing means toward each other and including a piston opposite sides of which are subjected to fluid pressure to effect a resultant differential force which yieldably holds said guiding and sizing means together to permit formed material larger than said pass to enter and expand the latter, and control means actuated by expansion of said pass for relieving the fluid pressure on one side of said piston and thereby increase the force exerted on the opposite side and urge said guiding and sizing means to position defining a relatively fixed accurately sized pass for shaping said material as it moves through said pass.

2. Apparatus for guiding and sizing substantially round material moving in an axial direction, comprising a plurality of hour-glass rolls arranged to provide a circular pass for said material, said hour-glass rolls being arranged in sets and one of said sets being mounted for movement toward and away from the other, fluid cylinder means for urging one of said sets of rolls toward the other and comprising a piston opposite sides of which are subjected to fluid pressure to effect a resultant differential force which yieldably holds said sets of rolls together to permit formed material larger than said pass to enter and expand the latter, and control means actuated by expansion of said pass for relieving pressure on one side of said piston and thereby increase the force exerted on the opposite side and urge said roll sets to position defining a relatively fixed accurately sized pass.

3. Apparatus for guiding and sizing material, comprising relatively movable guiding and sizing members disposed in position to define a pass of predetermined size, at least certain of said members being shiftable from said position by the entry of material therebetween to open said pass and facilitate entry of formed material of a size larger than said predetermined size, motor means for moving said members to their position defining said predetermined pass size and for holding said members in such position, and control means for actuating said motor means, said control means having an operator portion moved by the aforesaid entry of material between said members.

4. Apparatus for guiding and sizing material, comprising a pair of rolls disposed in opposed relation and in position to define a pass of predetermined size and relatively movable from such position by the entry of material therebetween to open said pass and facilitate such entry, motor means exerting a relatively light force

yieldably holding said rolls in said position defining said predetermined pass size, and control means operated in correspondence with pass-opening movement of said rolls, said control means causing said motor means to exert an increased force on said rolls to press them to and firmly hold them in predetermined pass-size position.

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